

# GREENSPACE TRENDS IN BLOOMINGTON, INDIANA 1993-2007

## City of Bloomington Environmental Commission

Heather Reynolds (Chair), Kelly Boatman (Vice Chair), Phaedra Pezzullo (Staff Coordinator), Linda Thompson (Senior Environmental Planner), Jacob Mazer (Intern), Michael Tosick (Secretary/Treasurer), Jacqui Bauer, Kriste Lindberg, Michael Litwin, Tom McGlasson, Don Moore, Isabel Piedmont, Laura Trout

with

Chuck Winkle

(GIS Specialist, City of Bloomington Department of Information and Technology Services)

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## **Introduction**

Accurate data are crucial for well informed public-decision making, and the City of Bloomington carefully tracks a wide range of variables, from number of residents and registered vehicles, to miles of streets, employment statistics, and number of tons of waste generated annually. The amount and distribution of undeveloped land in our community is equally important to track, as greenspace provides multiple social, economic, and environmental benefits, and is thus an important contributor to our city's quality of life. Accordingly, in 2003 the City of Bloomington Environmental Commission (EC) conducted a survey of greenspace in Bloomington over the prior ten-year period, producing a report entitled "Greenspace Trends in Bloomington, Indiana 1993-2003." The current report updates the findings of the 2003 study, extending the data to 2007.

As before, the City Planning Jurisdiction set the boundary for the study, and greenspace was defined using the following criteria:

- **The area must possess a permeable surface.** This includes forested, shrubby and grassy areas, parks, golf courses, cemeteries, and agricultural areas.
- **The area must be greater than one contiguous acre.**
- **The area must be more than ten feet from any manmade development, such as roads, parking lots, and buildings.**

This definition of greenspace excludes most lawns, roadside plantings, and wooded yards, as well as some pocket parks (e.g. Seminary Park). These areas certainly contribute to aspects of Bloomington's environmental quality, but are too small and fragmented to provide substantial benefits, and the majority would not likely be targeted for protection. Our study also excludes greenspace falling outside of the City Planning Jurisdiction, which applies to about 30% of City of Bloomington Parks and Recreation greenspace acreage that would otherwise meet our criteria.

Greenspace provides many well-documented benefits, often referred to as ecosystem services<sup>1</sup>. Although many of these services are taken for granted, their value to the human economy and quality of life is nevertheless profound. The economic value of all of earth's ecosystem services has been estimated at trillions of dollars annually, far exceeding the global gross national product.<sup>2</sup> Examples of the civic, economic, and environmental benefits provided by greenspace include:

- **Improved air quality and carbon sequestration.** Trees, shrubs, and other vegetation produce oxygen, absorb carbon dioxide, and filter particulates. A single tree can remove from 35 to 800 pounds of carbon dioxide from the atmosphere annually.<sup>3</sup>
- **Moderation of climate.** Vegetation has a substantial cooling effect in summer, helping to reduce the higher urban temperatures and associated energy costs for air conditioning. Vegetation also serves as a windbreak, and its insulating effect in the winter helps to reduce heating costs.<sup>4</sup>
- **Erosion control, water quality protection, and groundwater recharge.** Runoff water from impervious surfaces can erode soil, cause flooding, and carry sediment, hazardous material and chemicals into water supplies. In contrast, vegetated surfaces trap sediment and allow water to percolate into soil, reducing stormwater flow and replenishing groundwater.<sup>5</sup>
- **Habitat for wildlife.** Vegetated areas provide food and shelter for animals and microbes that in turn provide additional ecosystem services to humans, such as pollination, pest control, and cycling of wastes and nutrients.<sup>6</sup>
- **Recreation and promotion of healthier lifestyles for residents.** Greenspace provides opportunities for hiking, camping, and other outdoor activities that improve physical and mental health. Outdoor experiences in nature may be especially important for the physical and emotional well-being of children.<sup>7</sup>
- **Increased tourism and business.** Greenspace and greenways attract tourists, businesses, and a creative workforce<sup>8,9</sup>. The developing "B-Line Trail" will serve as an excellent example of this trend.
- **Improved real estate value.** Studies show a positive relationship between property value and proximity to greenspace.<sup>10</sup>
- **Prevention of youth crime.** Evidence suggests that parks and recreation programs structured to provide educational and social opportunities can help reduce crime.<sup>11</sup>

Greenspace inventory and protection is not a new concept, and has been pursued by many cities and states. Oregon, Washington, and Tennessee require their cities to establish urban growth boundaries. The Florida Forever program established in 1999 committed \$3 billion over a ten year period to acquire, protect, and restore open space, greenways, and urban recreational lands in Florida. By December 2006, more than 535,643 acres of land had been protected.<sup>12</sup> Many towns and counties have established their own local greenspace acquisition programs, including Madison, WI, Ann Arbor, MI, and Hamilton County, OH.

## **Methodology**

In 2003, the EC, with the support of the City Engineering, Planning, and Parks and Recreation Departments, Indiana University (IU), and the EC's intern program, initiated a study to assess greenspace cover within the City Planning Jurisdiction. The EC is a volunteer advisory body appointed by the Mayor and City Council that advises the City of Bloomington on environmental matters. The study examined the status of greenspace (i.e., whether the greenspace was held as park, preserve, public, or private land), and how the amount of greenspace changed over the prior decade.

Aerial photography, Geographic Information System (GIS) data, building permits, and site visits provided the data used to estimate greenspace cover in 1993, 1998, 2002, and 2003. Aerial photography from 1993 and 1998 were originally captured on film and were scanned, corrected, geo-referenced, tiled, and then loaded into the City's GIS. GIS infrastructure and development data are maintained between flight years through digitizing development drawings and plat submissions, and were aligned to the aerial photography. The City's GIS software was used to compare the aerial photography taken in 1993 with that taken in 1998 and with GIS road, building, parcel and proposed development layers to find changes in greenspace over the ten-year period from 1993-2003.

In April, 2005 and again in March, 2006, the State of Indiana produced new sets of aerial images, this time collected digitally by a sensor on the aircraft. Because these new sets were available in color as opposed to only black and white, this imagery allowed for more accurate visualization and vegetation analysis. These new data sets were added to the GIS database along with more recent data gleaned from permit information and engineering drawings from the City of Bloomington Planning Department. The permit information and engineering drawings allowed inclusion of area converted (or set to be converted) from greenspace to development since the 2005 and 2006 images were captured, bringing the data set current to July 1, 2007. Charles Winkle, GIS specialist with the City of Bloomington Information and Technology Services (ITS), reanalyzed the entire 1993-2007 data set. The help of Planning, Parks and Recreation, and the ITS Departments, along with aerial imagery and modern computer technology, has provided a high level of accuracy to this study data. The information and conclusions of this report are drawn from new maps and data generated in this study as well as comparisons to the data in the original 1993-2003 greenspace trends report. The 2007 City Planning Jurisdiction of 16,707 acres was used to set a standardized boundary for the study.

The two color-coded maps included in the appendix show current greenspace status and change over the 14 years since 1993. Figure 1 (seven-colored map) shows all current greenspace areas and areas converted from greenspace since 1993. All colored areas (green, red, yellow, orange, and pink) were initially greenspace in 1993. The 1993 GIS map was overlaid with the 1998 aerial photos, and any areas that were greenspace in 1993 but not in 1998 were colored red. Areas converted from greenspace between 1998 and June 2002 were identified using building permits and site visits, and are colored in yellow on the GIS map. Using the most recent 2005 and 2006 aerial images, the GIS proposed development layer, and engineering drawings, greenspace found to have been

lost between 2002 and 2007 was colored orange. Finally, areas where permits have been granted and construction has begun (expected to be lost by the end of 2007) were colored in pink.

Figure 2 (three-color map) shows current greenspace divided into three categories: Indiana University (IU) greenspace, park greenspace (controlled by the City of Bloomington Parks and Recreation Department), and non-IU/non-park greenspace (simply labeled greenspace). Table 1 presents the breakdown of greenspace acreage into those three categories in 1993, 1998, 2002, 2003, 2005, 2006 and 2007. Table 2 presents the same information in terms of percentage change.

In order to measure the geographic distribution of Bloomington's greenspace loss, the town was divided into quadrants, and the existing and lost greenspace was recorded for each quadrant. Walnut Street served as the east-west divider, while 3<sup>rd</sup> Street served as the north-south divider. By studying the zoning designation in areas of loss, the respective impact of various development types on Bloomington greenspace was also measured.

## **Findings**

In 1993, there were 8,495 acres of greenspace (Table 1). Put another way, approximately 51% of Bloomington's City Planning Jurisdiction acreage (16,707 acres) was greenspace in 1993. Of this, 1,283 acres were part of the IU campus and essentially outside the city's decision-making. Another 1,079 acres were classified as parks, the large majority of which was the Lake Griffy Nature Preserve. All of the rest, 6,132 acres, were neither part of IU nor the city's park system, and were therefore essentially "in play."

By 1998, greenspace that was neither park nor under university control had diminished to 5,188 acres (Table 1). By 2002, the number was 4,820 acres. By July 1<sup>st</sup>, 2007, only 3,831 acres remained, a decline of 2,301 acres. Thus, since 1993, 37.5% of Bloomington's "in play" greenspace has disappeared – an average rate of loss of about 2.7% per year (Table 2). This is similar to the rate of decline calculated in our 2003 study (2.5%). Some of the lost "in play" greenspace was converted into city parks. Due to significant acquisitions during the period of study, the city's park holdings increased by 297 acres, a 27.5% increase (Table 2). In contrast, the greenspace controlled by the university has decreased by 61.45 acres since 1993, a 4.8% loss (Table 2). Thus, the majority of the "in play" greenspace lost since 1993 (2,004 of the 2,301 acres or 87%) was neither converted to city parks or to IU greenspace.

Taking into account the losses in "in play" and IU greenspace and the gains in city park acreage, Bloomington has lost 2,065 acres of greenspace, approximately one quarter of its total 1993 greenspace, within the span of 14 years. Total greenspace acreage within the City Planning Jurisdiction is currently 6,429 acres. Thus, Bloomington's greenspace has dropped from 51% of total area in 1993 to 38% in 2007.

Of the greenspace lost over the last 14 years, 24% occurred within areas zoned for residential development, while 65% took place in areas approved for Planned Unit Development (PUD)—a designation that allows for land use by residential, commercial, and mixed-use developments. Because of the flexible nature of PUD zones, measuring the precise percentages of development type is difficult, but estimates drawn from viewings of the GIS maps place 80-85% of development occurring within these areas as directed toward residential usage. There is no doubt that residential development accounts for most of the greenspace loss in the City of Bloomington. Only 11% of greenspace loss took place in areas zoned for commercial development.

The southeast quadrant of town has experienced the most greenspace loss, losing nearly 906 acres (42%) of greenspace since the beginning of the study. The southwest quadrant has also seen significant losses. About 29% of greenspace in the southwest quadrant, a total of 753 acres, has disappeared since 1993. Very little of the remaining greenspace in the southern half of town is protected. Only 183 of the remaining 1,235 acres of greenspace on the southeast side, and 155 of the remaining 1,857 acres on the southwest side fall under the city's park inventory, while the rest may be considered "in play."

The greenspace in the northern half of Bloomington is somewhat better protected, due to the large holdings of the university and Parks and Recreation. The northwest quadrant has lost 17% of its greenspace, amounting to 230 acres, though development in recent years has been less rapid. Only the northeast quadrant, which contains 1,225 acres of greenspace held by IU, as well as 731 acres controlled by Parks and Recreation, has maintained close to its 1993 level of greenspace. Only 119 acres, or 5%, has been lost during the period of study.

## **Discussion and Conclusions**

This report demonstrates that, over the 14-year period from 1993 to 2007, Bloomington has steadily lost greenspace, particularly to residential development in the southeastern and southwestern quadrants of the city. The percentage of greenspace in Bloomington's Planning Jurisdiction dropped from 51% in 1993 to 38% in 2007. Dividing this report's 2007 greenspace acreage of 6429 acres by the United States Census Bureau's most recent (2006) Bloomington population estimate of 69,247 people<sup>13</sup> yields a current amount of greenspace per person in Bloomington of about 0.09 acre, or just under one tenth of an acre.

What will happen to the remaining 3,831 acres of "in play" greenspace in Bloomington? Within the City Planning Jurisdiction, city parks acquisitions have averaged 21 acres per year (297 acres over 14 years). At this rate of acquisition, it would take about 181 years to acquire all of the remaining in-play greenspace. In contrast, losses to development have averaged 143 acres/year (2,004 acres over 14 years). At this rate of loss, it would take only about 27 years to lose all of the remaining, developable greenspace within the City Planning Jurisdiction.

Protected greenspace in Bloomington has come about in a number of ways. During the Herman B. Wells administration, IU greatly increased the size of its campus, especially to the north where less development has occurred. The Indiana University Research and Teaching Preserve, located in that area, is active in greenspace acquisition and protection. However, IU's acquisitions have not dramatically expanded the amount of greenspace in Bloomington, and IU's greenspace has actually decreased by 4.8% since 1993 (Table 2).

Most city greenspace holdings (e.g. Lake Griffy, Wapahani Park) were deeded to Parks and Recreation from the City of Bloomington Utilities Department, which has no more land left to give. The 2005 acquisitions of the CSX rail corridor (a purchase funded largely by federal grants) and land adjacent to Griffy Lake Nature Preserve and Cascades Park added a total of 59 acres to the city's holdings. Other greenspace areas have been donated or otherwise protected by developers in negotiation with the Planning Department as a part of larger development projects. These areas, while valuable, tend to be small, fragmented, and prone to degradation through biological or human factors. For example, Latimer Woods is being heavily invaded by exotic plant species and is subject to dumping and vandalism. Though the 297 acres gained by Parks and Recreation in the study period are significant, representing a 27.5% increase in holdings, the new land to come under protection amounts to just 13% of the non-protected greenspace lost over the same period.

Considering the varied aesthetic, environmental, social, health, and recreational advantages of naturally-vegetated areas, and the importance of such benefits to the local economy, the EC strongly recommends that the City of Bloomington initiate and actively pursue an aggressive program of greenspace acquisition. It is clear from public debate that many in the Bloomington community would support such a program. Indeed, a recent survey by Parks and Recreation found that 61% of respondent households strongly agreed that preservation of open space and the environment was an important benefit, and favored establishing more greenspace and natural areas over the development of new sports fields<sup>14</sup>. At present, the city dedicates 15% of its cumulative capital development fund property tax income to the Parks Land Acquisition Fund, a sum that generally falls in the \$125,000-\$135,000 range. Given public sentiment, the rapidly closing window of opportunity, and the much larger expenditures in so many other areas, this sum is inadequate. Compare the \$134,023 directed toward land acquisition in 2007 to the \$1.1 million the City spent installing a waterslide and other amenities at Bryan Park Pool. This is not to say the money was spent poorly at Bryan Park. Indeed, Parks and Recreation has a clear mission to provide Bloomington's citizens with active recreational facilities and services in addition to passive and limited access acreage. Rather, this example serves to emphasize the city's relative lack of investment in greenspace. The EC recommends a minimum of \$500,000 to be dedicated annually to this purpose, before the opportunity for significant greenspace acquisition is lost.

There are a number of other mechanisms for acquiring significant greenspace areas. Our city's Unified Development Ordinance (UDO) includes options or requirements for conservation easements, buffer zones, and tree and forest preservation, among other environmental standards. Furthermore, the UDO includes a subdivision design –

conservation subdivision – that promotes preservation of open space by clustering development within only a portion of a given parcel. Conservation subdivision is an important alternative to suburban sprawl and the EC strongly recommends it over the standard suburban subdivision design. Other mechanisms include donations of land for preservation, cooperative ventures with non-profits such as Sycamore Land Trust and use of grants and loans from state and federal funding sources. Greenspace programs in other communities have employed other methods, such as tax exemptions for the preservation of open space and initiatives to recuperate abandoned land. The report “Towards a Comprehensive Greenspace Plan,” prepared in 2003 by the EC and available at [bloomington.in.gov/egov/docs/1074286872\\_475443.pdf](http://bloomington.in.gov/egov/docs/1074286872_475443.pdf), provides more detailed information on funding sources, existing greenspace programs, and prospective steps toward a Bloomington greenspace acquisition initiative. That report’s executive summary called on the City of Bloomington to create a Greenspace Taskforce to develop and implement a greenspace acquisition plan. The EC renews this recommendation. A long term, pro-active plan is long overdue.

**TABLE 1. Bloomington Greenspace Area By Category, 1993-2007 (in acres).**

<b>DATE</b>	<b>TYPE</b>	<b>AREA</b>
1993	Total	8,494.65
	IU	1,283.48
	Park	1,079.30
	Non-IU/Non-Park	6,131.87
1998	Total	7,645.60
	IU	1,256.52
	Park	1,201.10
	Non-IU/Non-Park	5,187.98
2002	Total	7,373.81
	IU	1,256.52
	Park	1,296.80
	Non-IU/Non-Park	4,820.49
2003	Total	7,114.86
	IU	1,254.20
	Park	1,296.80
	Non-IU/Non-Park	4,563.86
2005	Total	6,637.52
	IU	1,239.20
	Park	1,275.57
	Non-IU/Non-Park	4,122.75
2006	Total	6,584.95
	IU	1,239.20
	Park	1,335.45
	Non-IU/Non-Park	4,010.30
Up to July 1, 2007	Total	6,429.33
	IU	1,222.03
	Park	1,376.13
	Non-IU/Non-Park	3,831.17

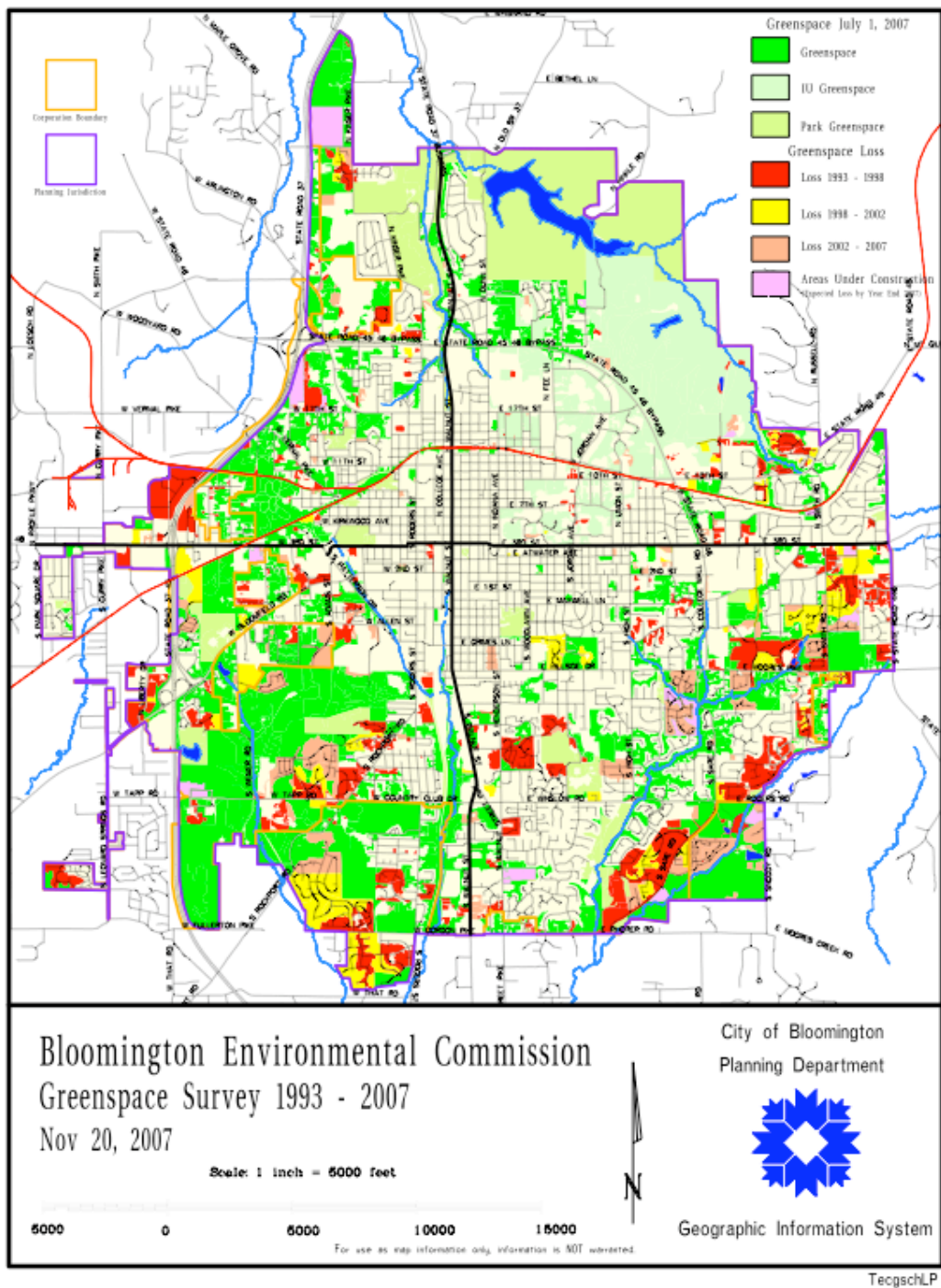


**TABLE 2. Bloomington Greenspace Loss, By Category, 1993-2007**

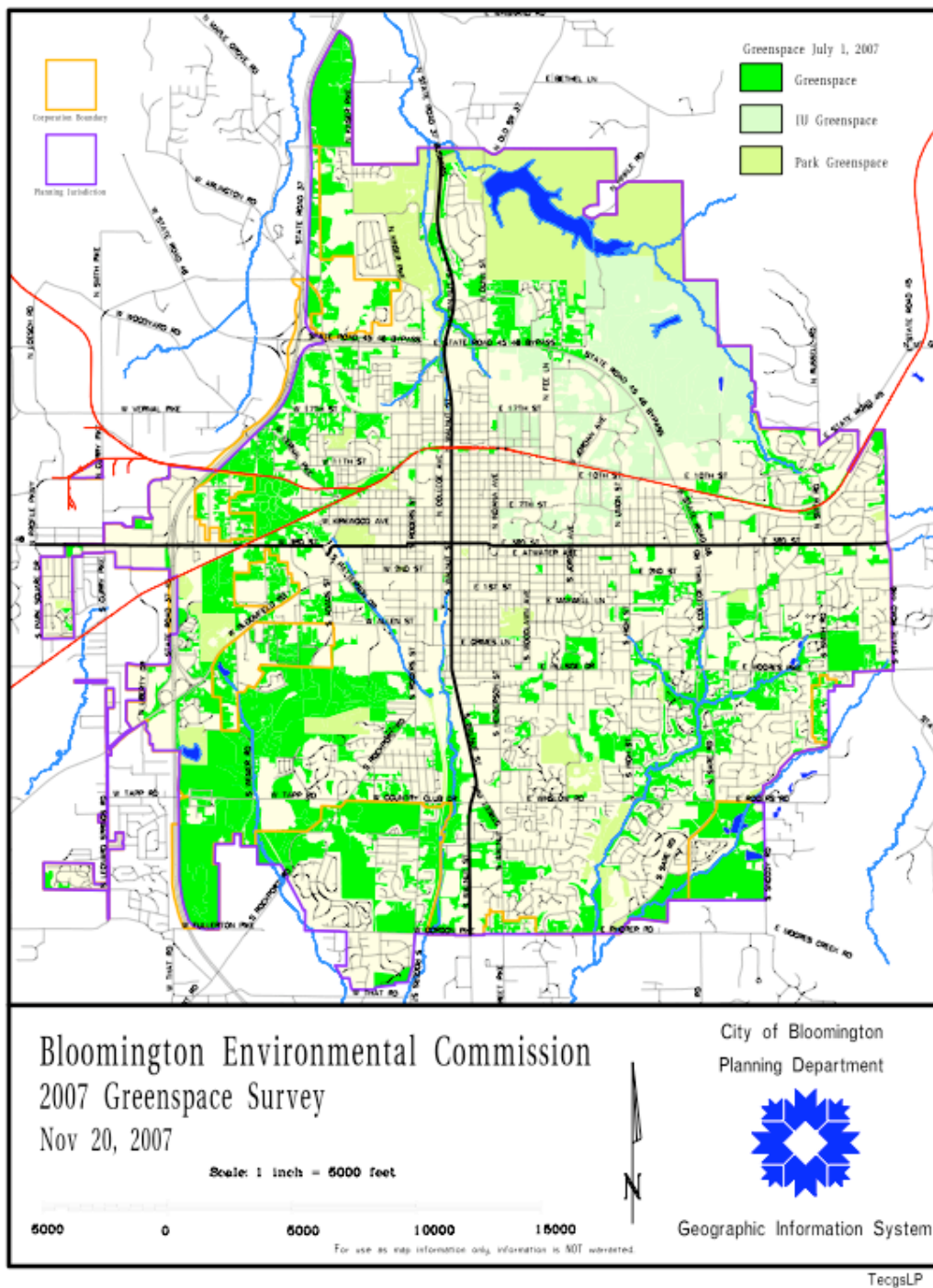
	% Loss since 1993	% Loss since 1998	% Loss since 2002	% Loss since 2003	% Loss since 2005	% Loss since 2006
<b>Total</b>						
1993	-	-	-	-	-	-
1998	10.0%	-	-	-	-	-
2002	13.2%	3.6%	-	-	-	-
2003	16.2%	6.9%	3.5%	-	-	-
2005	21.9%	13.2%	10.0%	6.7%	-	-
2006	22.5%	13.9%	10.7%	7.4%	0.8%	-
2007 (up to July 1)	24.4%	15.9%	12.8%	9.6%	3.1%	2.4%
<b>IU</b>						
1993	-	-	-	-	-	-
1998	2.1%	-	-	-	-	-
2002	2.1%	0.0%	-	-	-	-
2003	2.3%	0.2%	0.2%	-	-	-
2005	3.4%	1.4%	1.4%	1.2%	-	-
2006	3.4%	1.4%	1.4%	1.2%	0.0%	-
2007 (up to July 1)	4.8%	2.7%	2.7%	2.6%	1.4%	1.4%
<b>Non-IU/ Non-Park</b>						
1993	-	-	-	-	-	-
1999	15.4%	-	-	-	-	-
2002	21.4%	7.1%	-	-	-	-
2003	25.6%	12.0%	5.3%	-	-	-
2005	32.8%	20.5%	14.5%	9.7%	-	-
2006	34.6%	22.7%	16.8%	12.1%	2.7%	-
2007 (up to July 1)	37.5%	26.2%	20.5%	16.1%	7.1%	4.5%

	% Increase since 1993	% Increase since 1998	% Increase since 2002	% Increase since 2003	% Increase since 2005	% Increase since 2006
<b>Park</b>						
1993	-	-	-	-	-	-
1998	11.3%	-	-	-	-	-
2002	20.2%	8.0%	-	-	-	-
2003	20.2%	8.0%	0.0%	-	-	-
2005	18.2%	6.2%	-1.6%	-1.6%	-	-
2006	23.7%	11.2%	3.0%	3.0%	4.7%	-
2007 (up to July 1)	27.5%	14.6%	6.1%	6.1%	7.9%	3.0%

**FIGURE 1. Bloomington Greenspace Loss**



**FIGURE 2. Total Remaining Bloomington Greenspace**



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